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**BEFORE THE BOARD OF OIL, GAS, AND MINING
STATE OF UTAH**

IN THE MATTER OF THE PETITION OF GENWAL RESOURCES, INC., FOR REVIEW OF DIVISION ORDER 10-A	SUBMISSION OF UPDATED HYDROLOGIC REPORT DATED JANUARY 7, 2016 Docket No. 2010-026 Cause No. C/015/0032
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Genwal Resources, Inc. by and through its counsel of record hereby submits the Crandall Canyon Mine Hydrologic Update Report dated January 7, 2016, prepared by Petersen Hydrologic, attached as Exhibit A.

RESPECTFULLY SUBMITTED this 7th day of January, 2016.

BY: _____


ATTORNEYS FOR GENWAL RESOURCES, INC.
Denise A. Dragoo

CERTIFICATE OF SERVICE

I hereby certify that the original of the foregoing **SUBMISSION OF UPDATED HYDROLOGIC REPORT DATED JANUARY 7, 2016** was hand delivered to the Board of Oil, Gas and Mining and a true and correct copy was e-mailed on January 7, 2016, to the following:

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EXHIBIT A



PETERSEN HYDROLOGIC

7 January 2016

Ms. Denise Dragoo
Snell & Wilmer, L.L.P.
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Denise,

At your request, we have evaluated recent total iron concentrations in the Genwal Resources, Inc. Crandall Canyon Mine discharge water for the period from July 2015 through December 2015. The findings of our evaluation are presented in this letter report. The reader is referred to our previous report entitled *Investigation of Iron Concentrations in the Genwal Resources, Inc. Crandall Canyon Mine Discharge Water*, dated 7 November 2011, and also to our 10 January 2013, 11 July 2013, 16 December 2013, 9 June 2014, 15 January 2015, and 9 July 2015 update reports for additional supporting information in this regard.

Results of UPDES Monitoring Activities

Total and dissolved iron concentrations measured in both the untreated (PRE-002) and treated (UPDES 002) Crandall Canyon Mine discharge waters are presented in Table 1. Plots of total iron concentrations in Crandall Canyon Mine discharge waters through December 2015 are presented in Figure 1. A plot of monthly average total iron concentrations in untreated mine discharge water is presented in Figure 2. A plot of dissolved iron concentrations in untreated Crandall Canyon Mine discharge waters is presented in Figure 3. Sulfate concentrations in the untreated mine discharge water are

plotted in Figure 4. Yearly average mine-water discharge rates at the Crandall Canyon Mine are plotted in Figure 5. A plot of the annual average pounds per day of iron produced from the Crandall Canyon Mine discharge water is presented in Figure 6. A plot of TDS concentrations in the Crandall Canyon Mine discharge water is presented in Figure 7. As specified in the Mining and Reclamation Plan for the Crandall Canyon Mine, the results of all required monitoring parameters have been regularly provided to the Utah Division of Oil, Gas and Mining. Historical UPDES discharge monitoring data are available from the Division of Oil, Gas and Mining on-line coal water quality database at: <http://linux3.ogm.utah.gov/WebStuff/wwwroot/wqdb.html>

Total Iron Concentration Trends

During the period from July 2015 through December 2015 the total iron concentrations in the mine discharge water were low (Table 1). Of the six samples of *untreated* Crandall Canyon Mine discharge water sampled during the last three months of 2015, four had total iron concentrations compliant with the UPDES permit limits (1.24 mg/L). It is also noteworthy that there were no appreciable upward spikes in the total iron concentrations during the 6-month period from July – December 2015.

As noted previously, the underground mine iron geochemical regime is reactant limited. Therefore, over time, declines in total iron concentrations in the mine discharge water are anticipated. The observed behavior of the iron geochemistry in the untreated Crandall Canyon Mine discharge water (i.e. declining total and dissolved iron concentrations over time) are supportive of the correctness of the geochemical model we presented to the Division of Oil, Gas and Mining in February, 2010.

A plot of the annual average daily total iron production from the Crandall Canyon Mine discharge water is provided in Figure 6. The average daily iron production rate is calculated using the yearly average mine water discharge rate and the yearly average total iron concentration of the mine discharge water. From this information, the average

amount of total iron that is produced daily in the mine discharge water was calculated for the past six years. It should be noted that the iron produced from the mine is removed from the water at the treatment facility and it is not discharged in appreciable quantities to Crandall Creek. It is apparent in Figure 6 that the iron production rate has decreased steadily from 2010 through 2015. The average daily iron production from the mine during 2015 (5.22 pounds per day) is more than *four times less* than the amount produced in 2010 (21.6 pounds per day). The total iron production during 2015 decreased by 14 percent relative to the previous year 2014, which is reflective of the continuing decrease in the total iron coming from the Crandall Canyon Mine.

It is noteworthy that, because of both the decreasing total iron concentrations and the decreasing mine-water discharge rates at the Crandall Canyon Mine, the average iron production during 2013, 2014, and 2015 was less than that calculated for a UPDES compliant discharge of 1.24 mg/L at a mine-water discharge rate of 477 gpm (the average discharge rate for year the UPDES permit was issued). What this means is that if the average Crandall Canyon Mine discharge water during this most recent three year period had been allowed to flow untreated into Crandall Canyon Creek, the total iron loading to the creek would have been less than the amount allowed under the UPDES permit stipulation calculations at the time the UPDES permit was issued (i.e. a UPDES compliant water at 2011 mine water discharge rates).

It is apparent in Figure 1 that the magnitudes of the periodic upward spikes in the total iron concentration data since late 2009 have generally trended downward as the non-spike data has also trended downward (there were no significant upward spikes during 2015). This observation is consistent with a declining supply of available iron in the flooded underground mine environment and a gradual sweeping of the residual iron hydroxide particulates from the underground workings over time (i.e. the flow of water through the mine is gradually cleaning out the system).

Other Chemical Trends

During the period from July 2015 through December 2015 dissolved iron concentrations in the Crandall Canyon Mine pre-treatment water remained low – below the lower laboratory detection limit of 0.03 mg/L (Table 1; Figure 3). The general lack of a dissolved iron component is consistent with substantially lowered rates of pyrite oxidation in the underground mine environment.

As shown on Figure 4, sulfate concentrations measured in the pre-treatment mine discharge water during this evaluation period were low. The continuing declines in sulfate concentrations are consistent with decreasing levels of pyrite oxidation in the underground mine environment.

As shown on Figure 7, total dissolved solids (TDS) concentrations of the Crandall Canyon Mine discharge water have declined markedly since the initial onset of gravity discharge from the mine in late 2007/early 2008. TDS concentrations spiked sharply with the onset of gravity discharge from the mine, likely in response to increased rates of chemical reactions with minerals in the mine environment that were brought into contact with mine waters in newly flooded portions of the mine (including iron-producing pyrite mineral oxidation and related cascading reactions). As reactants were consumed and the reaction products were flushed from the mine by the flowing mine waters, TDS concentrations declined markedly (Figure 7). Recent TDS concentrations are now equal to or lower than those observed in the mine discharge waters during operational conditions immediately prior to the mine collapse event of August 2007 and the cessation of mine water pumping in September 2007. The plot of declining TDS concentrations in Figure 7 shows that the chemical quality of the water emerging from the mine has improved in an orderly manner over time (i.e. a well-defined exponential decay curve). This observation provides support to the reactant-limited geochemical model presented previously to the Board, which predicts declines in total iron concentrations.

Mine Water Discharge Rates

An updated plot of average yearly mine water discharge rates from the Crandall Canyon Mine is presented as a bar graph in Figure 5. It is apparent from Figure 5 that, after peaking at 1,016 gpm in 2001, the rate of mine water discharge from the Crandall Canyon Mine has been gradually decreasing. The average mine-water discharge rate for 2015 (300 gpm) was the lowest of the previous 14 years since the mine water discharge rate exceeded 1,000 gpm during 2001. The effects of climatic variability are not apparent in the plot.

Operations at the Crandall Canyon Mine Iron Treatment Facility

The Crandall Canyon Mine iron treatment facility operated throughout 2015. The mine-water treatment has been successful at reducing total iron concentrations to levels below the 1.24 mg/L limit of the mine's UPDES discharge permit (see Table 1 and Figure 1). Genwal Resources personnel continued to adjust the chemical application rates at the Crandall Canyon Mine iron treatment facility in response to changes in mine discharge rates and total iron concentrations during 2015. The objective of these adjustments is to achieve the necessary reduction in total iron concentrations in the post-treatment mine discharge water while using the least possible amount of chemical. By using only the lowest possible amount of chemical in the treatment facility, the release of excess chemical (that which is not consumed by the treatment reaction and retained in the settling cells) into the environment is minimized. The operating costs of the treatment facility are also reduced because of the lesser quantity of treatment chemicals required.

Future Total Iron Declines

Total iron concentrations in the *untreated* Crandall Canyon Mine discharge water during the most recent three month period (October – December 2015) were in compliance with the UPDES limits in four of the six samples collected during that interval (Table 1). It is noted that samples were collected by both Genwal and UDOGM personnel on the 8 December 2015 monitoring event and that the laboratory-measured total iron concentrations of both samples were in compliance with the 1.24 mg/L UPDES limit, with concentrations of 1.18 and 1.16 mg/L total iron, respectively.

The information presented in this update continues to support our conclusions that the observed decreasing trends in total iron concentrations are likely a result of 1) the decreasing rate of production of aqueous dissolved iron from pyrite oxidation reactions in the underground mine environment as chemical reactants are consumed, and 2) the gradual flushing of solid iron hydroxide particulate matter from the mine which is transported away from source areas by the current in actively flushing portions of the mine. It is anticipated that continuing declines in total iron concentrations in the mine discharge will occur in the future by these same mechanisms.

It is noted that while the total iron concentrations during the previous three-month period were mostly in compliance with the UPDES limit for total iron, there has historically been some temporal variability (upward and downward fluctuations) in total iron concentrations in the mine discharge water over time (Figure 1; Table 1). It is important to note that the magnitudes of upward and downward “bounces” in the total iron concentrations have become increasingly small as the overall concentration has trended downward (Figure 1). It is considered likely that there will continue to be some fluctuations and “bounces” in the total iron concentrations in the untreated mine discharge water in future months as the overall concentrations continue to decline. However, as the total iron concentrations continue to decline and the magnitudes of the concentration “bounces” remain small, the total iron concentrations will likely remain consistently below the 1.24 mg/L total iron concentration within a reasonable timeframe

(i.e. the upward concentration “bounces” will not result in exceedances of the 1.24 mg/L total iron UPDES standard while the average concentration is below the UPDES limit).

We recommend that monitoring of total iron concentrations in the mine discharge water be continued to evaluate future concentration trends and verify that future concentrations remain low.

Conclusions

Total iron concentrations in the untreated Crandall Canyon Mine discharge water during the July-December 2015 evaluation period were low. Four of six samples of Crandall Canyon Mine discharge water collected in the most recent three month period (October – December 2015) were in compliance with the UPDES permit limits for total iron.

The observed chemical compositions and the documented temporal variability in the geochemistry of the mine discharge water are consistent with the hydrogeochemical - hydrogeologic model that describes the source and fate of the total iron in the Crandall Canyon Mine discharge water that we presented in February of 2010.

As stated in our previous reports and testimony before the Board, it remains my professional opinion that perpetual discharge of mine water containing elevated total iron concentrations at the Crandall Canyon Mine will not occur. Rather, continuing future declines from current levels (which in the most recent 3-month period were at or near UPDES compliance) are anticipated to occur in the future. This conclusion is supported by the combined evidence of the essential absence of a dissolved iron component, the continuing decline in sulfate and TDS concentrations in the water, the declining total iron production from the mine, and the previously discussed general absence of elevated total iron concentration in gravity discharges of mine water from other coal mines in the region.

Genwal Resources, Inc. currently has a three-year bond in place for the future operation of the Crandall Canyon Mine treatment facility. In my professional opinion, there is a very high probability that the total iron concentration in the untreated Crandall Canyon Mine discharge water will decline to levels consistently below the 1.24 mg/L UPDES limit within this three-year period.

To verify this conclusion, Genwal Resources, Inc. will continue to collect and analyze hydrologic data relating to the Crandall Canyon Mine discharge as required.

Please feel free to contact me should you have any questions in this regard.

Sincerely,



Erik C. Petersen, P.G.
Principal Hydrogeologist
Utah PG #5373615-2250



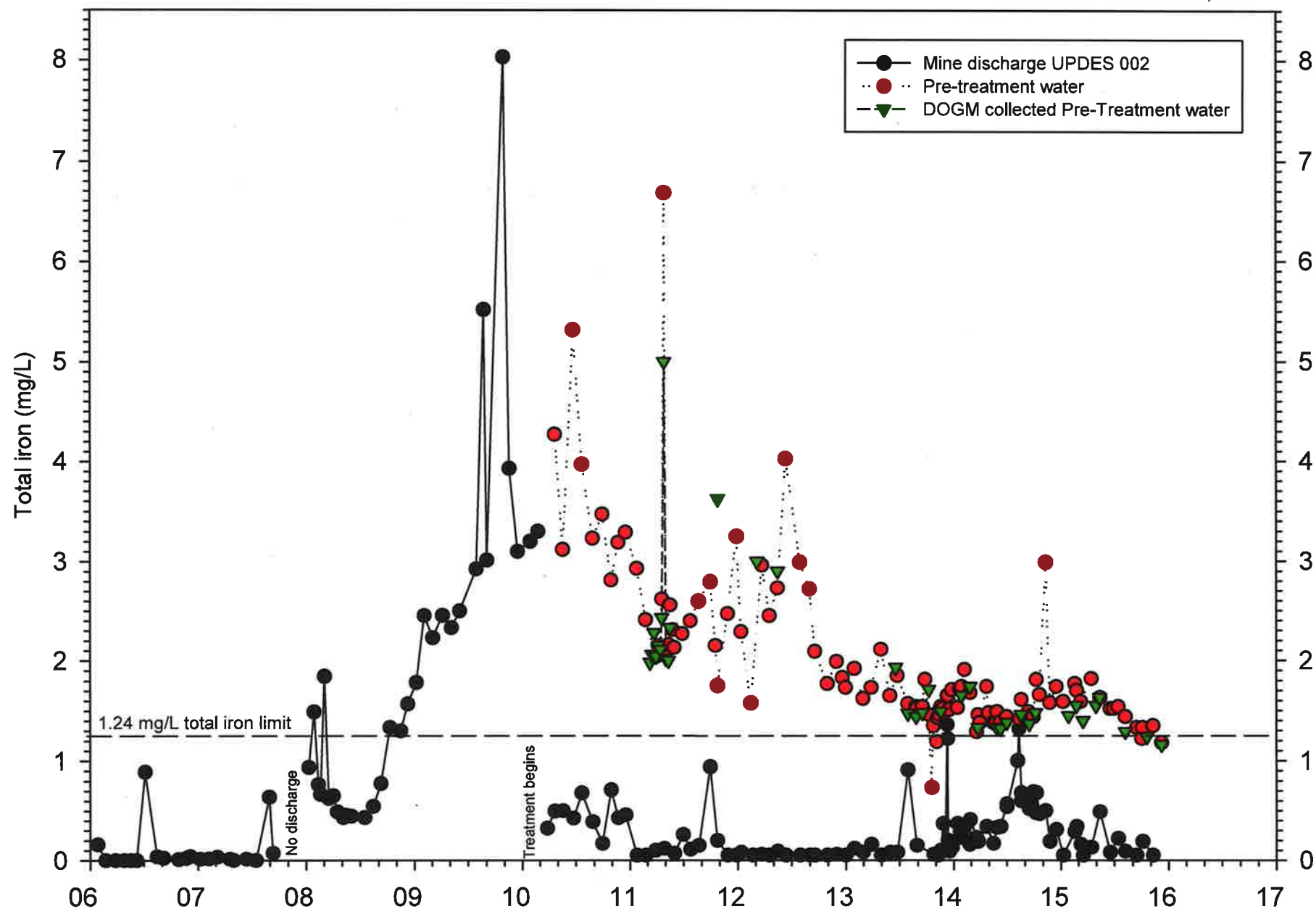


Figure 1 Plots of total iron concentrations in Crandall Canyon Mine discharge water and treated mine discharge water.

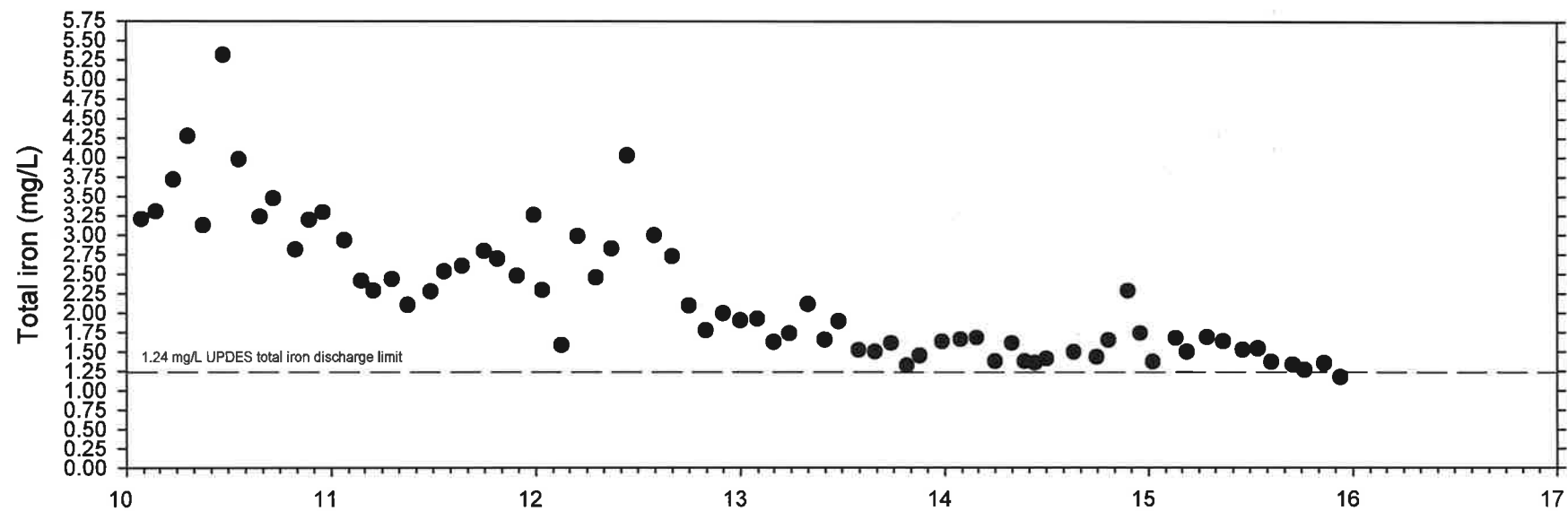


Figure 2 Plot of untreated Crandall Canyon Mine discharge water total iron concentrations (monthly averages) at PRE-002.

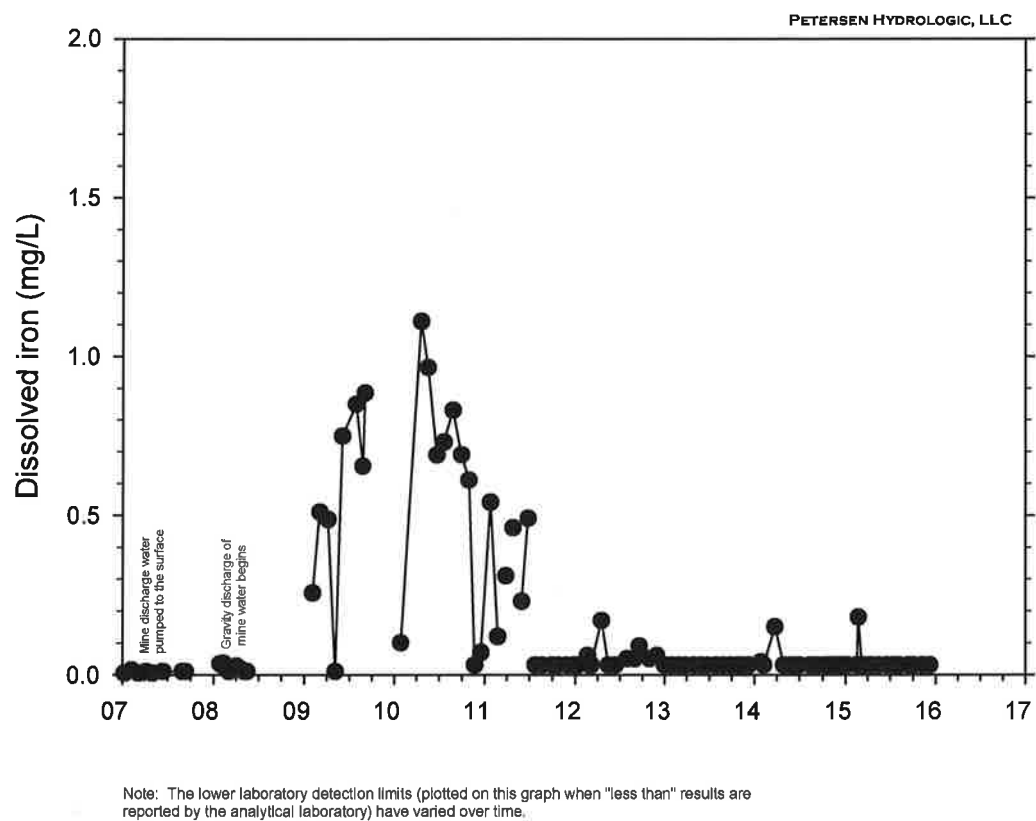


Figure 3 Dissolved iron concentrations in Crandall Canyon Mine pre-treatment discharge water, 2007-2015.

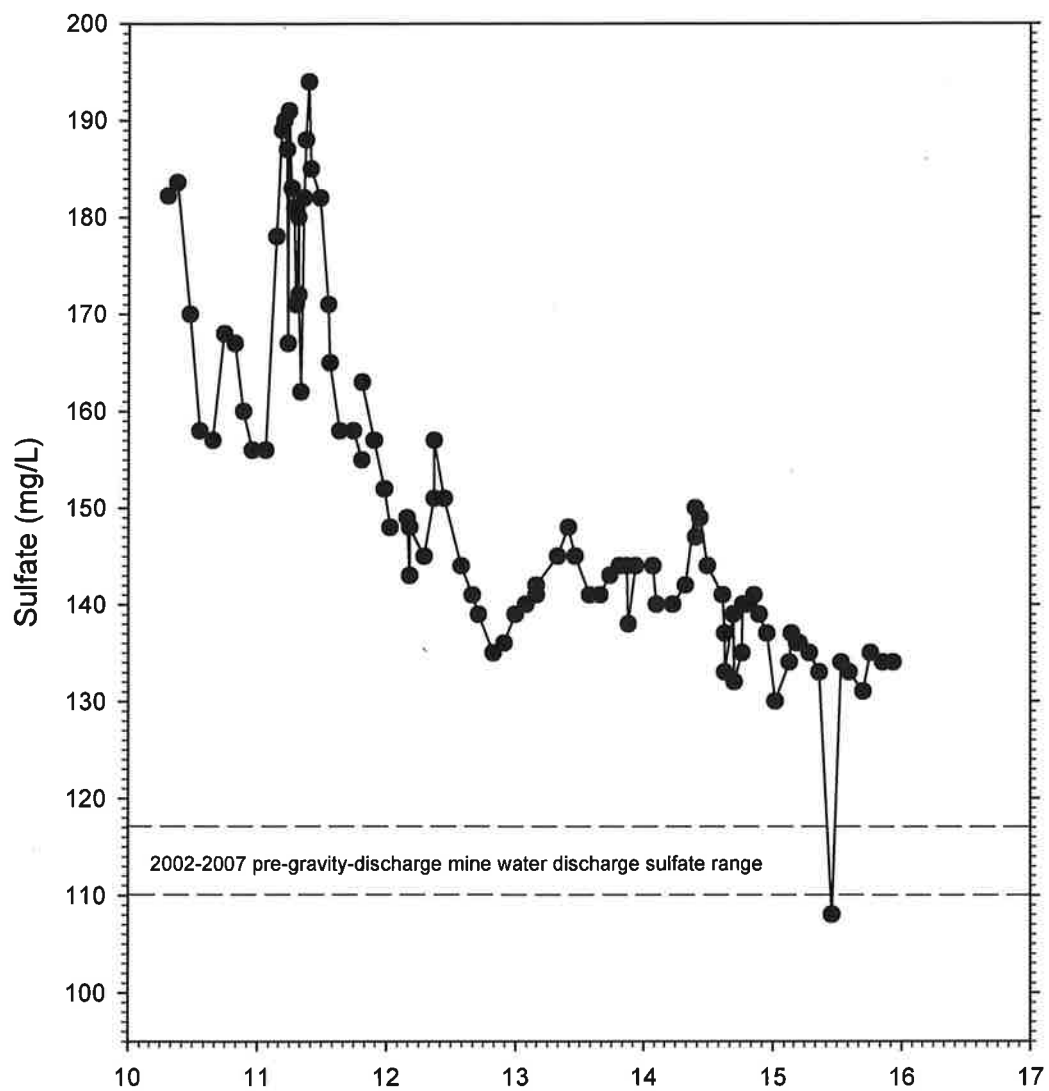
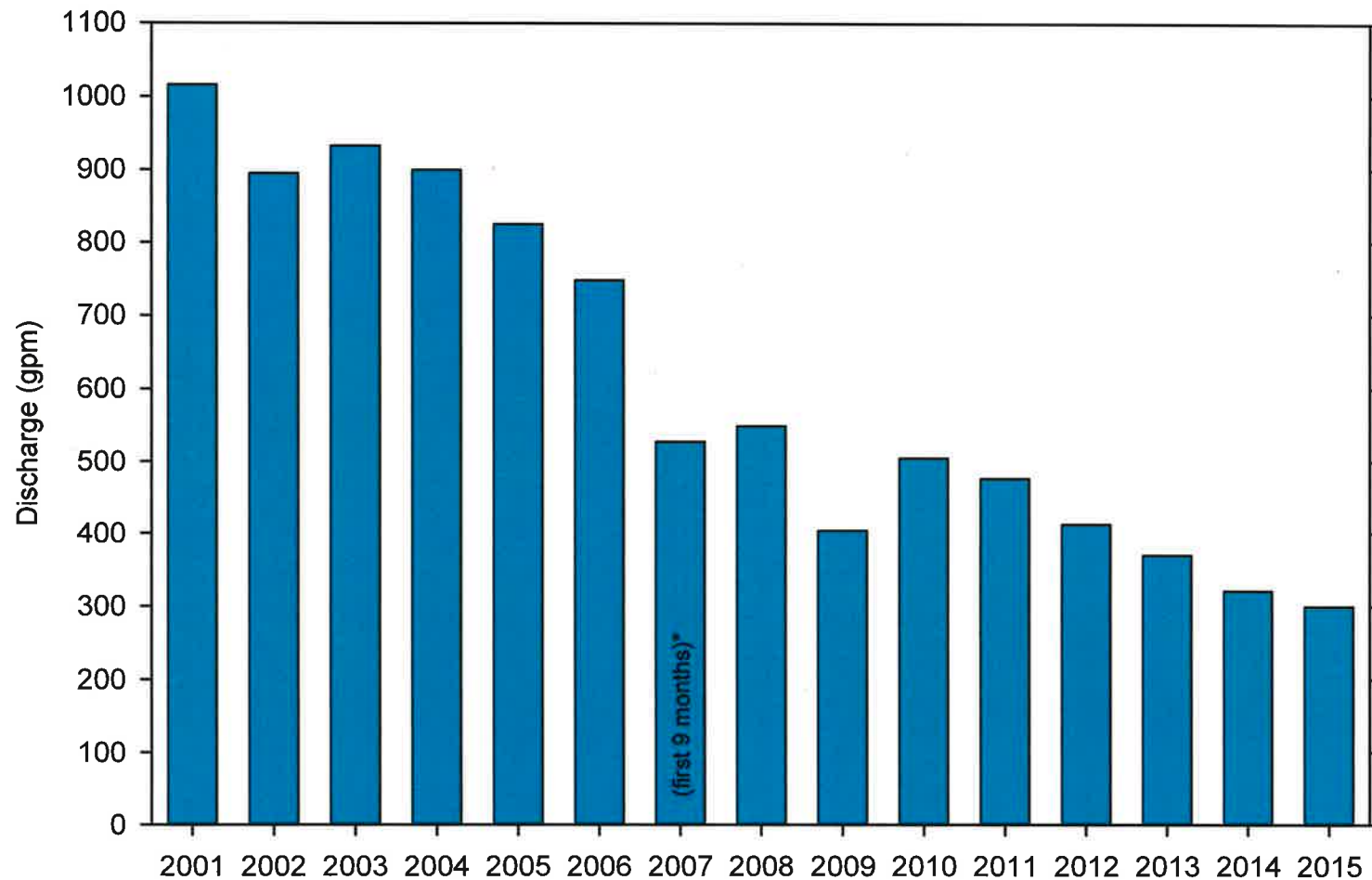


Figure 4 Sulfate concentrations in the Crandall Canyon Mine discharge water (site Pre-002).

Crandall Canyon Mine Average yearly mine discharge rate



*The average discharge rate for the first 9 months of 2007 is plotted because during the last 3 months of 2007 the mine pumps had been shut off but gravity discharge of mine water to the surface had not yet occurred.

Figure 5 Average yearly mine water discharge rates for the Crandall Canyon Mine.

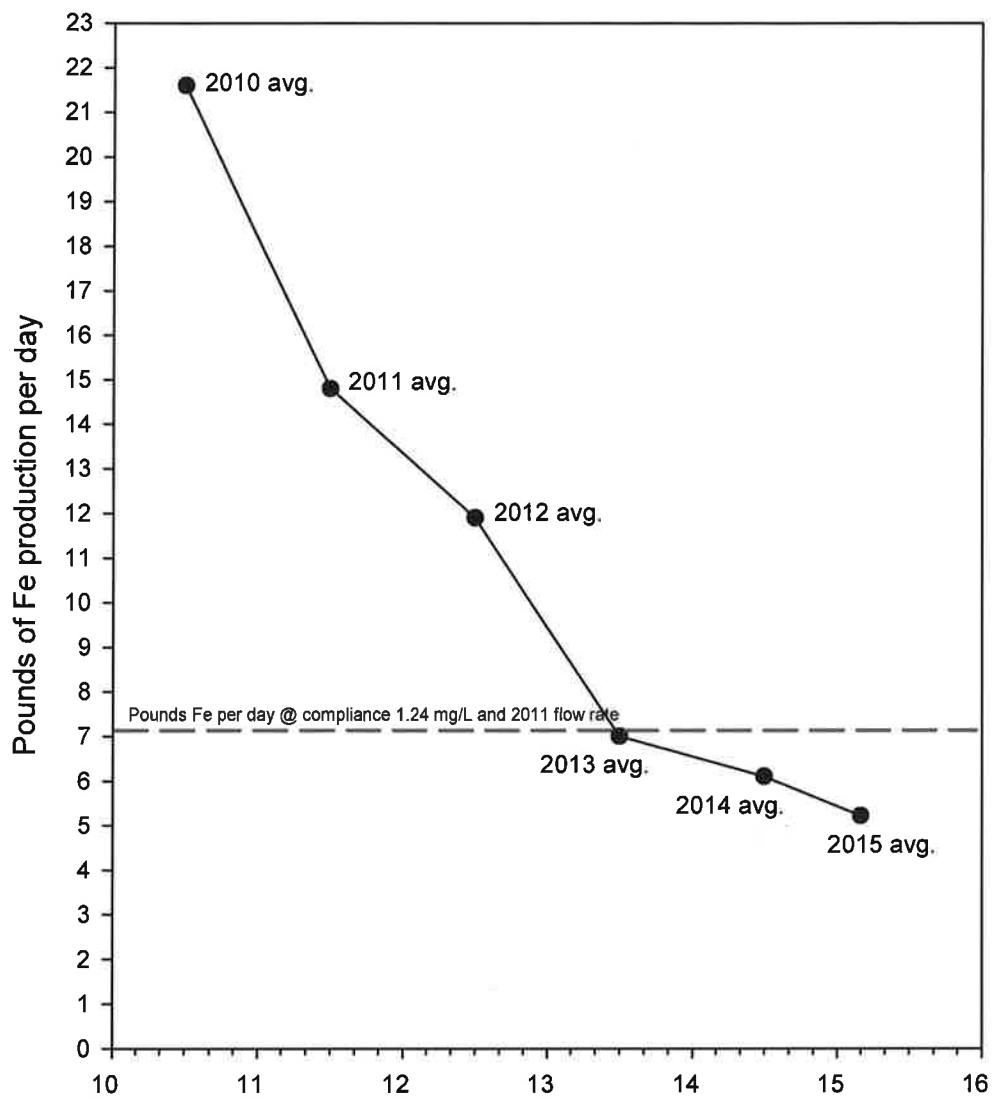


Figure 6 Daily quantity of iron produced by the Crandall Canyon Mine discharge water (calculated from annual average total iron concentration and average annual mine water discharge rate).

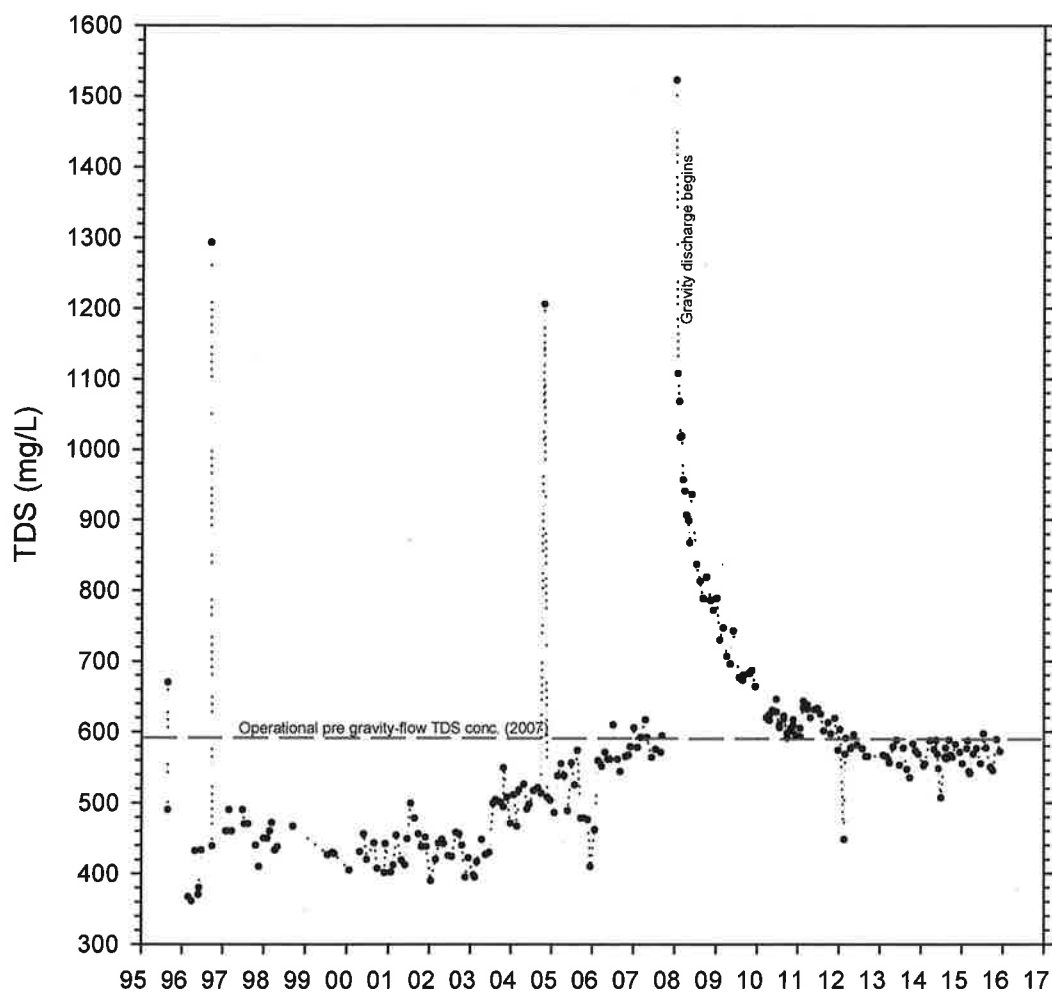


Figure 7 TDS concentrations of Crandall Canyon Mine discharge water.

Table 1 Total iron, dissolved iron, and sulfate concentrations in Crandall Canyon Mine discharge water.

UPDES 002

treated mine water discharged to Crandall Creek

PRE-002

untreated mine discharge water

	Fe (total) mg/L	Fe (dissolved) mg/L		Fe (total) mg/L	Fe (dissolved) mg/L	Sulfate mg/L
1/29/2013	0.12	<0.03	1/29/2013	1.92	<0.03	140
2/28/2013	0.08	<0.03	2/28/2013	1.62	<0.03	141
3/28/2013	0.16	<0.03	3/28/2013	1.73	<0.03	142
4/30/2013	<0.05	<0.03	4/30/2013	2.11	<0.03	145
5/30/2013	0.08	<0.03	5/30/2013	1.65	<0.03	148
6/19/2013*	1.93	---	6/19/2013*	1.93	---	145
6/24/2013	0.08	<0.03	6/24/2013	1.85	<0.03	145
7/30/2013	0.91	<0.03	7/30/2013	1.57	<0.03	141
7/30/2013*	0.880	---	7/30/2013*	1.47	---	148
8/27/2013*	1.090	---	8/27/2013*	1.44	---	153
8/29/2013	0.15	<0.03	8/28/2013	1.54	---	---
9/17/2013	0.07	---	8/29/2013	1.52	<0.03	141
9/17/2013*	0.077	---	9/17/2013	1.54	---	---
9/26/2013	0.16	<0.03	9/17/2013*	1.48	---	135
10/9/2013	0.10	---	9/26/2013	1.81	0.03	143
10/17/2013	<0.05	---	10/9/2013	1.46	---	---
10/24/2013	0.06	<0.03	10/9/2013*	1.71	---	144
11/8/2013	<0.05	---	10/17/2013	0.74	---	---
11/14/2013	0.07	<0.03	10/24/2013	1.35	<0.03	144
11/16/2013	0.37	---	11/4/2013	1.19	---	---
11/19/2013	0.10	---	11/8/2013	1.43	---	---
11/26/2013	0.37	---	11/14/2013	1.46	<0.03	144
12/3/2013	0.10	---	11/16/2013	1.52	---	---
12/10/2013	1.36	0.05	11/19/2013	1.54	---	---
12/10/2013*	1.14	---	11/19/2013*	1.49	---	138
12/11/2013	1.22	---	11/26/2013	1.52	---	---
12/12/2013	0.2	---	12/10/2013	1.65	<0.03	144
12/17/2013	0.09	---	12/10/2013*	1.48	---	---
12/26/2013	0.13	---	12/12/2013	1.65	---	---
1/14/2014	0.37	---	12/17/2013	1.51	---	---
1/22/2014	0.29	---	12/26/2013	1.71	---	---
1/28/2014	0.23	<0.03	1/14/2014	1.53	---	---
1/18/2014*	0.21	---	1/22/2014	1.72	---	---
2/7/2014	0.34	<0.03	1/28/2014	1.74	0.04	144
2/24/2014	0.16	---	1/28/2014*	1.65	---	---
2/26/2014	0.41	---	2/7/2014	1.91	<0.03	140
2/26/2014*	0.40	---	2/26/2014	1.68	---	---
3/20/2014	0.23	---	2/26/2014*	1.74	---	---
3/25/2014	0.19	<0.03	3/20/2014	1.29	---	---
3/25/2014*	0.17	---	3/25/2014	1.46	0.15	140
4/30/2014	0.15	<0.03	3/31/2014	1.38	---	---
4/23/2014	0.34	---	4/23/2014	1.74	---	---
5/16/2014	0.17	---	4/30/2014	1.46	<0.03	142
5/28/2014*	0.33	-	5/16/2014	1.38	---	---
6/10/2014	0.34	<0.03	5/23/2014	1.37	---	---
6/10/2014*	0.34	-	5/28/2014*	1.33	-	150
7/1/2014	0.57	-	5/29/2014	1.49	<0.03	147
7/1/2014*	0.54	<0.03	6/10/2014	1.39	<0.03	149
8/7/2014	1.00	-	6/10/2014*	1.32	-	149
8/11/2014	1.32	<0.03	7/1/2014	1.44	<0.03	144
8/19/2014	0.68	<0.03	7/1/2014*	1.38	-	-
8/19/2014*	0.60	-	8/13/2014	1.42	<0.03	141
9/12/2014	0.61	<0.03	8/19/2014	1.61	<0.03	137
9/15/2014*	0.52	-	8/19/2014*	1.46	-	133
9/29/2014	0.69	-	9/12/2014	1.49	<0.03	139
10/7/2014*	0.48	-	9/15/2014*	1.37	-	132
10/9/2014	0.68	<0.03	9/29/2014	1.44	-	-
10/20/2014	0.47	<0.03	10/7/2014*	1.48	-	135
11/10/2014	0.50	<0.03	10/9/2014	1.81	<0.03	140
11/24/2014	0.19	<0.03	10/20/2014	1.66	<0.03	140
12/16/2014	0.31	<0.03	11/10/2014	2.99	<0.03	141
1/8/2015	<0.05	0.12	11/24/2014	1.58	0.03	139
1/27/2015*	0.28	---	12/16/2014	1.74	<0.03	137
2/17/2015	0.29	<0.03	1/8/2015	1.59	<0.03	130
2/23/2015	0.34	---	1/27/2015*	1.45	---	---
2/23/2015*	0.32	---	2/17/2015	1.77	<0.03	134
3/9/2015	0.16	---	2/23/2015	1.70	0.18	137
3/17/2015	<0.05	<0.03	2/23/2015*	1.55	---	---
3/17/2015*	0.28	---	3/9/2015	1.59	<0.03	136
4/14/2015	0.13	<0.03	3/17/15*	1.40	---	---
4/30/2015*	0.29	---	4/14/2015	1.82	<0.03	135
5/13/2015	0.49	<0.03	4/30/2015*	1.55	---	---
5/13/2015*	0.33	---	5/13/2015	1.63	<0.03	133
6/17/2015	0.08	<0.03	5/13/2015*	1.63	---	---
6/29/2015	0.06	---	6/17/2015	1.52	<0.03	108
7/14/2015	0.22	<0.03	6/29/2015	1.52	---	---
8/7/2015	0.09	<0.03	7/14/2015	1.54	<0.03	134
8/7/2015*	0.12	---	8/7/2015	1.44	<0.03	133
9/14/2015	<0.05	<0.05	8/7/2015*	1.29	---	---
10/5/2015	0.19	<0.03	9/14/2015	1.33	<0.03	131
10/20/2015*	0.05	---	10/1/2015	1.22	---	---
11/19/2015	<0.05	<0.03	10/5/2015	1.33	<0.03	135
12/8/2015	0.15	---	10/20/2014*	1.24	---	---
12/8/2015*	0.16	---	11/9/2015	1.45	<0.03	134
			12/8/2015	1.18	<0.03	134
			12/8/2015*	1.16	---	---

* Sample collected by the Utah Division of Oil, Gas and Mining and analyzed by Utah State Department of Health laboratory